



## Cooperation between NIMS and Rolls Royce

National Institute for Materials Science

NIMS and Rolls Royce have been exchanging views on high temperature alloys for gas turbines for more than 10 years. We recently agreed to conduct joint research on ultra-high temperature alloys for aircraft engines and signed an agreement which provide the basis for this work.

I am happy to report that today we held the Opening Ceremony for the joint laboratory on 30<sup>th</sup> June where NIMS and Rolls Royce will carry out joint research at NIMS Sengen Site in Tsukuba City, Ibaraki Prefecture, with the British Ambassador, Sir Graham Holbrook Fry, and Dr. Akihiro Fujita, the Deputy Director-General of Ministry of Education, Culture, Sports, Science and Technology (MEXT) in attendance.

High temperature gas turbines are used in jet engines for aircraft. In particular, heat resistance is required in the gas turbine blades, which are a key component of the turbine. The material for this part is a special alloy composed mainly of nickel, which is called an “ultra-high temperature single crystal alloy”.

In order to increase the thermal efficiency of aircraft jet engines, and thereby reduce fuel consumption, it is necessary to increase the temperature of the combustion gas. The development of alloy materials which can withstand these higher combustion gas temperature is a difficult challenge for research, but NIMS has been involved in fundamental research on high temperature alloys for many years and has deep experience and knowledge in the field. On the other hand, Rolls Royce is the world’s No. 2 maker of aircraft jet engines and has a wealth of experience and knowledge related to the application of high temperature alloys to gas turbines.

Thus, in this joint research, we have planned a division of labor in which NIMS will conduct fundamental research on materials and Rolls Royce will carry out research for practical application of the materials.

If we can enhance the thermal efficiency of aircraft engines by improving material heat resistance, it will be possible to reduce aircraft fuel consumption, thus reducing air travel and transportation costs in spite of the recent jump in oil price. Even more important, it will also be possible to conserve resource, save energy, and reduce loads on the environment. In this way, Japan’s fundamental and basic research will make a substantial contribution to solving global environmental and energy problems.

As the President of NIMS, I have long told our researchers that “the true value of materials is in their use”. In materials research at NIMS, we make a contribution to society as a public

research institute not simply by raising the scientific level of research, but by ensuring that the resulting “materials” are actually used. We have adopted the concept that “the true value of materials is in their use”, including this sense of social contribution, as the NIMS motto.

Promoting practical use through industry-academic cooperation is an effective measure for ensuring that the materials created by fundamental research are used in the world. (Because NIMS is an Independent Administrative Institution, or IAI, we refer to this as industry-IAI cooperation.) Today, the world’s leading university, public research institutes, and companies are acting with a global vision, and globalization of cooperative relationships has also begun. NIMS objective is to become a core materials research institute not only in Japan, but at the global level. The aircraft industry serves a global market, and is a typical industry in which cooperation between companies is progressing at the global level. The cooperative relationship between Rolls Royce and NIMS, which goes beyond national borders, is expected to realize “the true value of materials” in “ultra-high temperature single crystal alloys” on a global scale. We are confident that this “true value of materials” will also benefit Japanese business and the Japanese people as a whole.

Here, I would like to give you a brief introduction to NIMS.

NIMS was launched as an Independent Administrative Institution in April 2001 by merging two existing research institutes, the National Research Institute for Metals and the National Institute for Research in Inorganic Materials, both of which were part of the former Science and Technology Agency.

NIMS completed its 1<sup>st</sup> Mid-Term Program, which covered a period of 5 years, in March 2006 and embarked on its 2<sup>nd</sup> Mid-Term program, covering the 5 years until 2011, in April of current year. We have established two broad priority research and development regions, “Creation of novel nanotechnology-based materials” and “Advanced materials responding to social needs” and are carried out research with an organization consisting of 20 Centers in 6 fields.

Dr. Harada, who is responsible for this joint research project on the NIMS side, is the Managing Director of the High Temperature Materials Center, which belongs to the field “Materials Research for the Environment and Energy” in the region of “Advanced materials responding to social needs”.

In this cooperative relationship between Rolls Royce and NIMS, a joint laboratory was established in NIMS, and research will be carried out in mutual cooperation based on the division of roles between the two sides.

Among the various kinds of technical development related to gas turbines, Rolls Royce has adopted a policy of promoting fundamental research in the form of joint research in joint laboratories with universities, under the general name University Technology Center, or UTC. Thus, in its fundamental research, the company is truly making great use of industry-university cooperation, and is putting into practice the concept of perfecting practical technologies through mutual cooperation.

UTC not only exist in the U.K., but also extends to the EU countries and United States. However, this joint laboratory with NIMS will be the first in Japan. To ensure that this joint research is fruitful, we plan to establish new cooperative relationships with universities outside of Japan, forming other UTC, through Rolls Royce.

Because Rolls Royce has a long record of cooperation with Japanese heavy industry makers in the aircraft engine business, a further expansion of the range of cooperation is expected. Moreover, as Rolls Royce supplies aircraft engines to Japanese airlines, as well as airlines in many other countries which fly to Japan, we hope to see engines based on NIMS materials technology carrying the Japanese people and flying in the skies of Japan.

Finally, I would like to mention that July 1, 2006 will make the 50<sup>th</sup> Anniversary of the establishment of the former National Research Institute for Metals. Although Dr. Harada's research has produced many important results, this was supported by the tradition created by those who preceded us, and the wealth of data that they accumulated. Therefore, in concluding today's happy occasion, I would like to express our thanks to our predecessors. At the same time, I will also pledge to strive for dramatic new achievements in research on metal materials in the next 50 years, as we continue their great work.